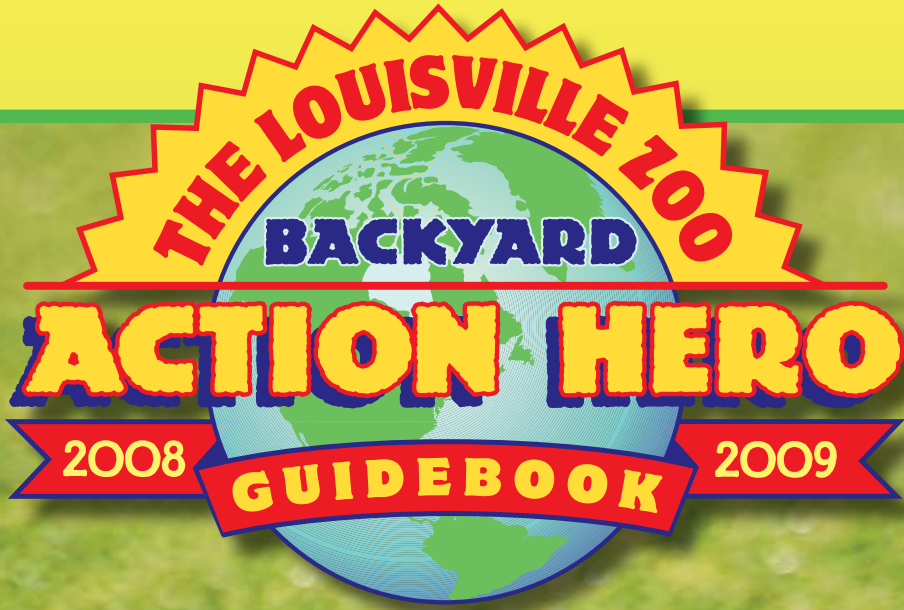


Toyota | georgetown

TOYOTA MOTOR MANUFACTURING, KENTUCKY, INC.



WETLANDS

PLUS INFO ON, THE YEAR OF THE
FROG

Lots of Fun Facts! • Cool Activities! • Awesome Animals!

Welcome Future Heroes

We are so glad that you have reported for your Backyard Action Hero Mission. At Toyota Motor Manufacturing, Kentucky, Inc. (TMMK), we believe that protecting the environment is part of our mission to be a Good Neighbor across Kentucky. As we build cars in our plant in Georgetown, we are committed to protecting the environment, obeying the environmental laws, preventing pollution and continuously improving our processes. But the commitment doesn't stop there. It is everyone's responsibility to protect the environment.

Becoming a Backyard Action Hero is the first step in learning about how we all coexist with the plants and animals that make up our environment. Once you have learned about some of the things in this book, you will be ready to accept your mission to take action in your own backyard. Good luck!



*Sincerely,
Your Friends at
Toyota Motor
Manufacturing,
Kentucky, Inc.*

What is a Backyard Action Hero?

A Backyard Action Hero – or BAH as they are called – is a kid or an adult who is really into wildlife and habitats and is ready to take

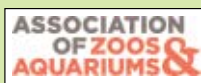
action to protect them. They think being “green” is cool, and they know that to really make a difference you not only need to learn, but you also need to act! BAHs care about animals and habitats in their own backyards as well as all around the world. Since the Louisville Zoo is a great place to learn about all kinds of plants and animals, our BAH crew will check out what's going on there and introduce some of the Zoo's real life conservation heroes!

Meet the BAH Crew

Four Backyard Action Heroes will lead you through this book as you prepare to become a BAH yourself! Wade knows a lot about water and Skye is an expert on air. Tanya is really into making things grow and Alden is all about animals. They all think being green is cool and they're all ready to help you take action to help the planet!

What is AZA?

The Louisville Zoo is one of over 200 zoos that are accredited by the Association of Zoos and Aquariums (AZA). The AZA is an important group that ensures animals get great care and visitors have great experiences at its zoos.



Wade



Skye



Tanya



Alden

Hello Again Backyard Action Heroes,

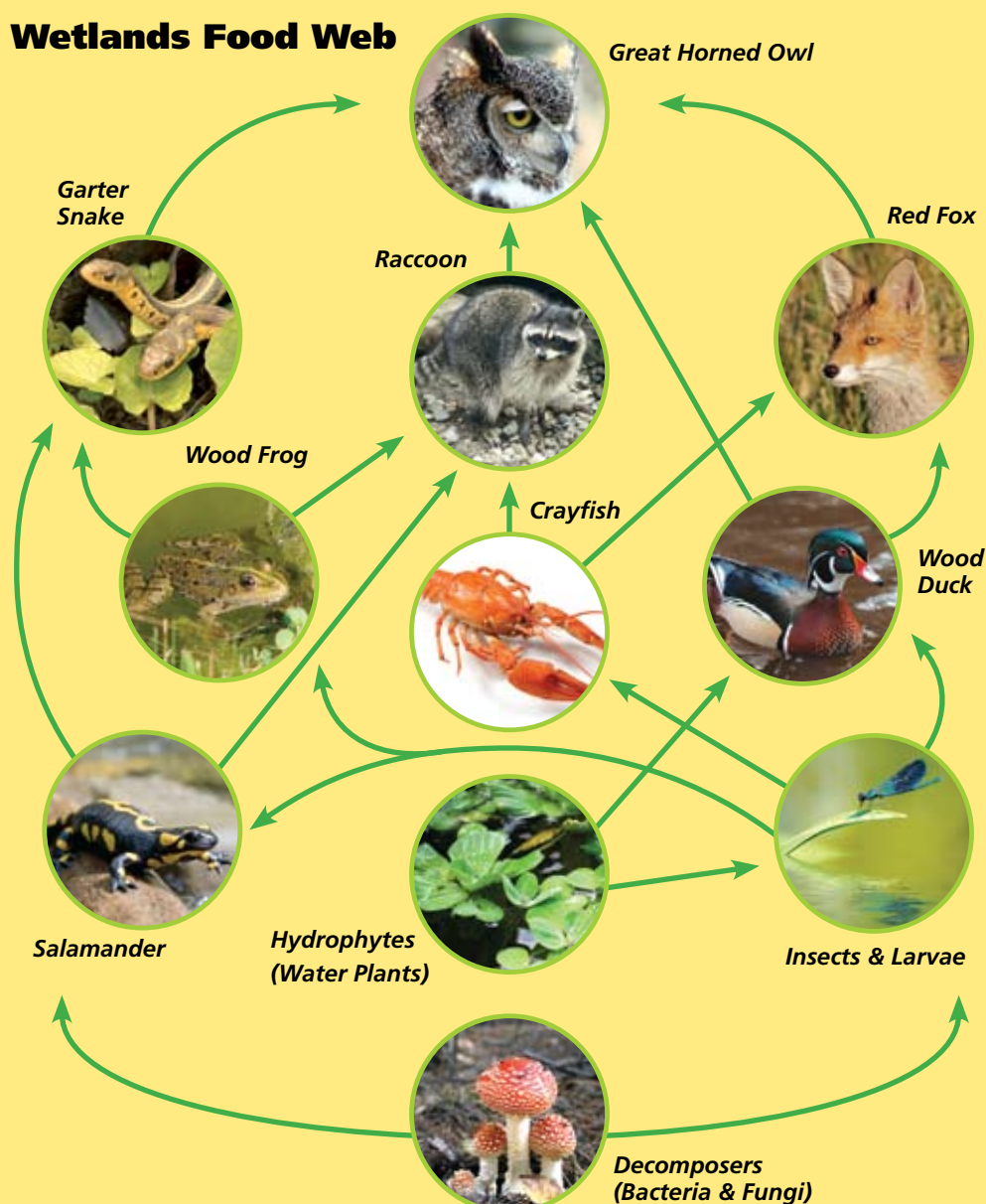
This year is going to be an exciting year for AZA accredited institutions like the Louisville Zoo. The AZA has declared 2008 to be **Year of the Frog**. If you are wondering why the focus on the frog, well, this Backyard Action Hero booklet will help you find the answer.

In this issue, Backyard Heros will learn about some cool animals including frogs and their amphibian relatives. We'll also find out about some of the important ecosystems they depend on for survival.

If you were asked to find a frog, you would probably head off to the

nearest pond, lake, swamp or marsh. These areas are collectively known as **wetlands**. Wetlands are not only important to creatures like amphibians, but play a role in food chains and food webs of many different species on our planet, including humans.

Wetlands Food Web



What Are Wetlands?

There's more interesting info about wetlands on page 6.



The word "wetlands" means different things to different people. Some people think of these areas as wastelands, "buggy" places that are not useful to humans. Others use terms like "swamp," "marsh" or possibly "bog" depending on what part of the country they are from. The fact is that wetlands are extremely important places for a multitude of reasons. We are going to learn about some of those reasons in this Backyard Action Hero publication.

First we need to define just what a wetland is and how to recognize one when you see it. Wetlands are transitional areas between land and bodies of water like rivers, lakes and oceans.

Three things must be present in order for an area to be labeled a "wetlands."

1. First it must have a

certain type of hydrology.

Hydrology is related to how water is held in the area. The hydrology of wetlands involves having standing water or saturated conditions all or part of the year. **Saturated** means that the soil holds a lot of water.

2. Secondly, for the area to be called a wetland it

must contain hydrophytes.

"Hydro" means water, and "phytes" means plants. So **hydrophytes** are plants that have adaptations that allow them to survive in wet conditions. Typical hydrophytes are cat-tails, lily-pads and cypress trees.



Activity 1

Characteristics of Hydrophytes

Materials needed:

Magnifying glass, scissors, leaf from cat-tail or similar wetlands plant.

Procedure:

1. Collect some leaves off of some typical wetlands plants. Cat-tails are good plants to use.
2. Cut out about an inch long piece of the leaf.
3. Use your magnifying glass to observe the leaf.

Hydrophytes have large air spaces that can be observed running up through the leaf. These large spaces allow the plant to transfer oxygen down to the roots. Root systems in



these plants are usually under water and are standing in oxygen poor soil. The air spaces are an adaptation to deal with these conditions. These spaces also provide strength

to the leaf so it can remain upright in the soft, wet soils.



Draw what you see in the magnifying glass.

3. The third qualification for an area to be labeled a wetland is the presence of hydric soils. **Hydric soils** are oxygen poor soils that are usually very dark in color. If you have ever walked in a pond or lake and pulled your foot up out of the mud and it looked dark gray or greenish-gray, that's hydric soil.

The soil in your backyard may look more orange or red. This reddish look is because the soil has iron in it and when exposed to oxygen it rusts. If no oxygen is available the iron is a dark greenish color.

Terms like "swamp," "marsh" and "bog" are perfectly legitimate terms to use when talking about wetlands and are actually related to specific characteristics associated with various kinds of wetlands.

Bogs are characterized by mossy plants that thrive in the acidic conditions of the bog. The Everglades in Florida is an example of a marsh. Reelfoot Lake in Tennessee is a cypress swamp and Okefenokee in Florida has components of all three: swamp, marsh and bog.

Swamps are wetlands that are dominated by trees or woody plants, such as cypress or button bush.



Marshes are wetlands that are dominated by herbaceous plants, or plants that are grass-like. Cat-tails, reeds, and sedges are examples of marshy plants.

Activity 2

Oxygen-poor Soils

Materials needed:

Soil testing tool or small hand trowel.

This type of simple test is how to determine where a wetlands area begins or ends.

1. Take your soil testing tool (hollow pipe-like tool with a handle) or a simple gardening trowel and dig up a few samples of soil in your yard.
2. Note the color.
3. Now find a nearby wetlands, or possibly a pond or lake.

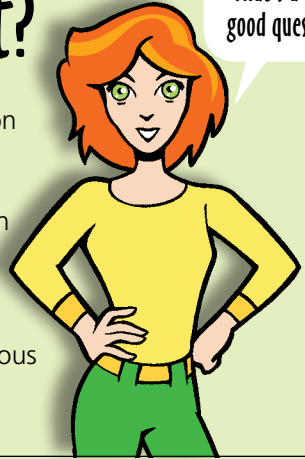
4. Take several samples as you get nearer the wetlands and note changes in color of soil. Eventually you will take samples in the wetlands (or lake/pond) itself.

You should notice that the soil in the wetlands is much darker than the soil in more upland areas, like your backyard. Upland areas tend to have more oxygen getting into the soil, thus the color is reddish or orange because the soil contains iron which "rusts" or "oxidizes" when in the presence of oxygen. In areas of low oxygen the iron remains a dark green to almost black color.

Soil Test Observations

Why Are Wetlands Important?

That's a very good question.



The world's wetlands have long been a focus of conservation efforts due to the important ecological and economic benefits they provide. They are second only to tropical rainforest in the number of species they contain. We often associate such animals as frogs and other amphibians with wetlands, because these animals need water to lay their eggs. But many other species also depend on these areas for finding food, fresh water and breeding grounds. Waterfowl, fish, various snakes and many species of mammals live in or frequently visit wetlands.

All coastal areas tend to have transitional salt water marshes or estuaries.

Jane Franklin, Head of Animal Training at the Louisville Zoo talks about some of those species that depend on coastal wetlands areas for survival:

"California Sea lions rely on the western coastal waters of North America for their habitat and food. They gather in the Channel Islands for breeding and pupping each year in the spring. Before this gathering, the sea lions put on great amounts of weight to hold them over for the breeding season. Some of these sea lions have learned to use the Chinook salmon runs on the Columbia River in Oregon. When the salmon return up the Columbia River to spawn, the sea lions chow down! The problem with this is the competition with people

over the salmon. This is causing an economic impact on the areas that depend upon the salmon. Since the institution of the Marine Mammal Protection Act in 1972, the sea lion population has grown from 50,000 to nearly 300,000! All along the west coast, the sea lions have expanded their range and taken over docks, boats and beaches. Not only are they competing for fish in the ocean and rivers, they are competing for space to haul out and bask. This example of the need to strive for a balance between humans and animals illustrates how limited habitat will have a great impact upon all species, including humans!"



Birds and Wetlands –

A Conservation Crisis in Our Future?



The Louisville Zoo recognizes the importance of wetlands and participates in a number of conservation efforts involving wetlands species. **Gary Michael** is the Curator of Birds at the Zoo, and he is here to share how birds depend on these watery ecosystems.

"Most of the nearly 10,000 species of birds live within easy access to a source of water. In fact, 80% of species routinely use a regular or permanent water source and many of these water features can be categorized as a wetland. Wetlands, shallow bodies of water less than 20-feet deep, such as coastal mangrove swamps or inland freshwater ponds, are in critical need of our conservation support because of the rate of speed humans are using up, polluting or altering these resources. Knowing most birds need access to these same water features, it is no wonder that scientists are concerned that the next 100 years might see the extinction of many species of birds. At the Zoo, we manage a number of aquatic-type birds that have native homes at risk of destruction.

Cranes from southern and eastern Asia are at risk because of the rapid alteration and pollution of water features in China. Sadly, 8 of the world's 15



*species of crane live in this region. The Zoo displays the demoiselle crane (*Anthropoides virgo*), sarus crane (*Grus antigone*), and endangered red-crowned*

*crane (*G. japonensis*). Our demoiselle cranes are managed in retirement as "seniors," and our male is in fact the oldest bird at the Zoo at the ripe old age of*

41. The sarus crane, now considered vulnerable to extinction, was bred for the first time at our Zoo 19 years ago. The red-crowned crane is in danger of extinction because the population of just 2,000 birds is on decline and because wetlands continue to be destroyed. Because of its rarity, our Zoo is devoting ample resources to breeding the species and managing it for a long-term period. Our young female is a new addition to the Zoo and you can see her at the Islands area.

In Southeast Asia, the biggest threats to wetlands come from mining, unsustainable fishery

practices, and conversion to agricultural and urban lands.

The wattled crane (*Bugeranus. carunculatus*), Africa's tallest crane, is vulnerable to extinction because of its dependent on wetlands. Wetlands in Africa are being lost because of conversion of the pristine waters to growing rice, draining for urbanization, and sometimes flooding by the construction of dams. At our Zoo, the species was first displayed more than a decade ago in one exhibit in the African area. Since then, a number of offspring have been produced.

Flamingos are another group of birds threatened by

the degradation of wetlands around the world. Our Zoo displays the Chilean flamingo (*Phoenicopterus chilensis*). It's found in wetlands high in the mountains of western South America.

At our Zoo, this species has been displayed since 1969 and first bred in 1992. Since then, more than 20 chicks have hatched."

Cranes are really cool!
Did you know there are 15
different species of cranes?



The Education Department at the Louisville Zoo offers many classes for school and other interested groups. The Louisville Zoo actually has a native wetlands area on its property that is used for numerous programs focusing on the importance of wetlands. Many of these programs use animals from the Zoo's education collection in order to give the participants a real life experience with wetlands animals.

Drew Koch is in charge of the care of those animals that are part of education classes and has this to say:

"Many of the animals that live in the Zoo's Education Center have wild relatives that depend on wetlands areas for survival. These animals include the tiger

salamander, Jefferson's salamander, Argentine horned frog, Eastern box turtles and a variety of pond turtles. All these animals, aside from the

Argentine horned frog, can be found in and around wetlands right here in Kentuckiana.

Wetlands species present some special challenges when it comes to conservation efforts. Whether those efforts are "in situ," which is another way of saying in their natural habitat, or in a zoo situation, special care must be taken in dealing with these animals. This is especially true for frogs and other amphibians."



Dr. Zoli Gyimesi, Louisville Zoo Veterinarian, deals with all the animals at the Zoo and has some insight on the subject of the importance of water to amphibians:

"The delicate, permeable skin of frogs and many other amphibians, makes water availability a requirement for survival. Since their skin does not act as a great barrier to water loss, most amphibians cannot tolerate a dry environment. This

permeable skin is largely what makes amphibians extremely sensitive to environmental changes associated with acid rain, pollution, and other toxins. Amphibian skin can not only absorb things in the environment, it is

also fragile. So if you're lucky enough to see frogs or salamanders in your backyard, enjoy looking at them but avoid picking them up! The roughness of our hands, as well as the normal oils present, can be harmful."

To understand better how the skin of frogs and many other amphibians is different from other creatures try Activity 3.



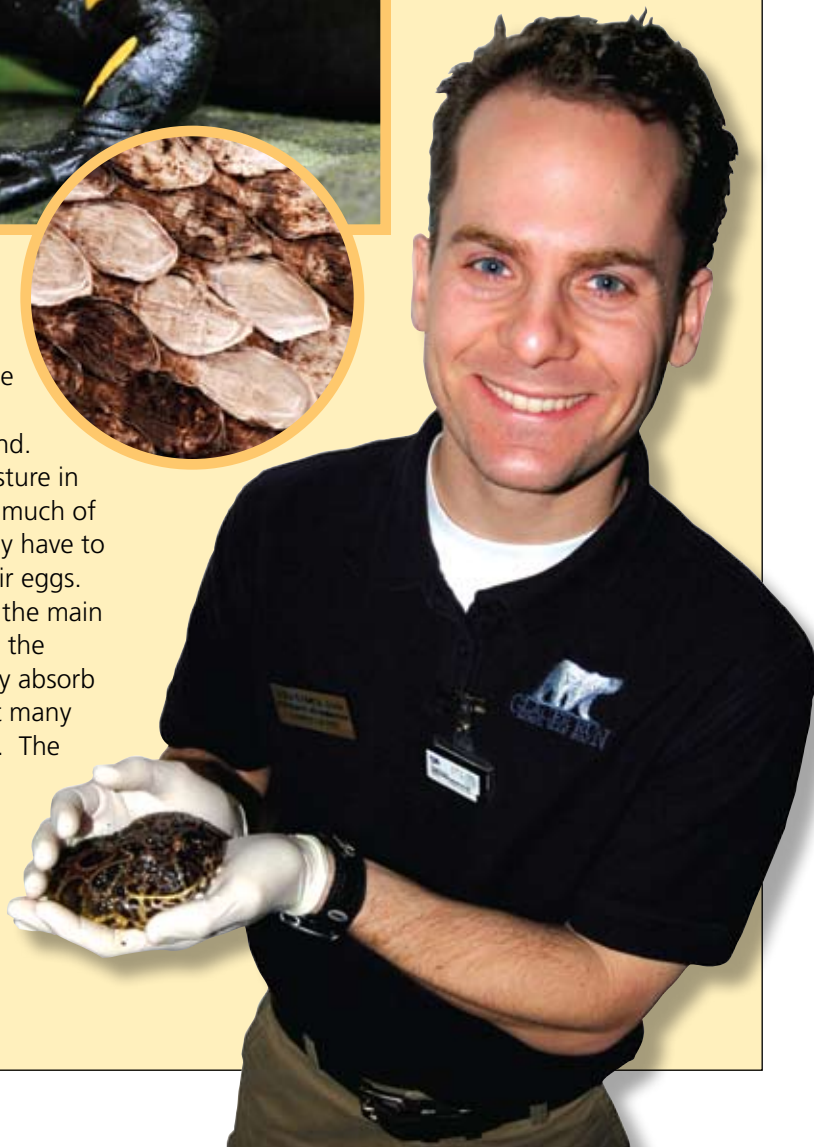
Fire salamander



Eastern mud salamander

Background:

Amphibians have a slimy coated skin. Reptiles are covered with scales (right). The reptilian skin is an adaptation for spending more time on land. This scaly skin helps hold moisture in the body. Amphibians spend much of their time in water, in fact they have to have water in order to lay their eggs. Their slimy coated skin is also the main way they take in oxygen from the environment. Not only do they absorb oxygen through that skin, but many other things can be absorbed. The activity on the next page will help the BAH understand the difference between the skin of an amphibian and the skin of a reptile.



Activity 3

Amphibian Skin vs. Reptile Skin



Materials:

Two hard-boiled eggs (Preferably not cracked), two cups or mugs, water, food coloring, paper towels.

1. Fill two cups with some warm water and place several drops of food coloring in each cup. Red or Blue food coloring will be the best for this experiment, mainly because it is easier to see.
2. Take one of the hard boil eggs and remove the shell. Leave the shell intact on the other egg.
3. Place one egg in one cup and one egg in the other cup.
4. Let sit for about 24 hours.
5. Remove eggs from liquid. Blot dry with a paper towel. Now note what has happened to the egg that has no shell. Cut or break the egg apart to see how far the food coloring has penetrated.
6. Now peel the egg with the shell. Note how far the color penetrated this egg.



Questions to answer:

Which egg was most like the skin of an amphibian?

Which egg was most like the skin of a reptile?

What was the difference in the penetration of the food coloring in the two eggs?

How does this relate to what you have learned about amphibians?



The Louisville Zoo Wetlands Trail is an educational facility on the property of the Louisville Zoo. This native wetlands area was opened in 1995 for special guided programs focusing on wetlands, deciduous forest ecosystems and Kentucky species.

The area was created and is maintained almost entirely by volunteer efforts. This small wetlands is home to a wide variety of species. Green frogs, bull frogs, several kinds of tree frogs and spotted salamanders are just a few of the amphibians that have been seen in the area.

Doug McCoy, the Assistant Curator of Education at the Louisville Zoo was project manager for the Wetland's Trail. Doug is here to talk about some of the ecological and economic benefits of wetlands:

"Wetlands are some of the most important ecosystems on the planet. They are second only to tropical rainforests in productivity and number of species. Many of the species that zoos are fighting to preserve come from these valuable areas. About 43% of all the species on the U.S. Endangered Species List depend on wetlands for survival. Not surprisingly their biggest problem is habitat destruction. We have lost over 50% of the wetlands that existed in the lower 48 states since we became a nation.

Interestingly, the main reasons wetlands were given specific protections in the last 25 years was because of the other benefits they provide.

Wetlands help purify water and control flooding. When humans construct water treatment plants or sewage treatment facilities they create man-made wetlands that mimic those in nature. It has also become clear that building levies and channelizing streams doesn't control flooding as well as natural floodplain wetlands areas

which absorb and release water slowly back into the streams.

Wetlands are also major sources of food.

70% of the seafood we eat is dependant on coastal wetlands. Other foods found in wetlands are cranberries, blueberries, waterfowl, turtle, alligator, crayfish and the number one commercially grown grain in the world, rice. Wetlands play a role in numerous food webs and are especially important to many migrating species.

In some parts of the world, where areas have

been heavily deforested, the peat or organic matter that accumulates in the bottoms of wetlands is mined for fuel. People in these areas use the peat for cooking and heating. All of these things present great economic benefits to go along with the ecologic benefits of wetlands. Billions of dollars are spent annually in the U.S. alone for wetlands related activities such as boating, fishing and bird watching. If you take time to think about it, we are all connected to wetlands in one way or another."



Emily is another real life backyard action hero and she's wild about – well – about the wild! She loves animals of all kinds but she's also into habitats like wetlands and rainforests and even glaciers!

Emily is living proof that you can make a difference for wildlife no matter how old or young you happen to be. She started a Marine Biology Club at her high school and has volunteered at the Louisville Zoo for many years. Last year she was selected to represent the Zoo as its Teen Artic Ambassador in Churchill, Manitoba Canada where she spent two weeks learning about and observing polar bears with other kids from around the world.

You can read more about Emily at www.louisvillezoo.org/projectpolarbear – but let's hear what she has to say about one of her favorite topics – conservation.



Hello, fellow Backyard Action Heroes!

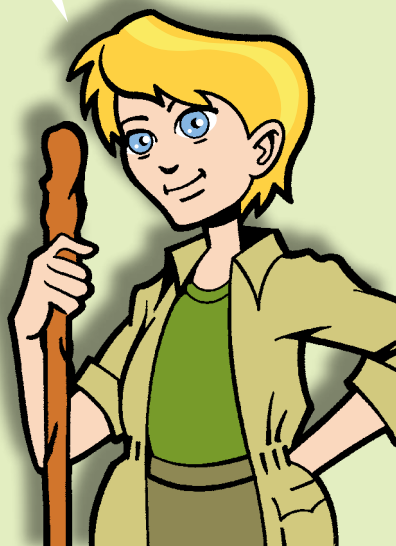
I need your help. There are many species of animals that are facing extinction due to climate change, including the mighty polar bear. As Arctic Ambassador for the Louisville Zoo, I spent time in Churchill, Manitoba studying how climate change is affecting the bears. I learned how serious the situation is, but I also learned something very encouraging – it's not too late to save them. And I also learned that every single person can have an impact – each of us can make a difference.

*So I am asking for your help. I am asking each of you, as a Backyard Action Hero, to make a pledge for a reduction in your carbon imprint, or how much energy you use. The less energy you use, the less CO2 gases will be released. With hard work and some luck, we could stop climate change and save the many species of animals that are in danger – including us humans. **To make your pledge, go to***

www.louisvillezoo.org/projectpolarbear, and just follow the directions. You and your parents can choose the category that fits your family best as a family. Then make sure to tell all of your friends about it so they can make their pledges, too. In December, I'll be taking your pledges to Washington, D.C., to show our country's leaders that we are serious about stopping climate change.

Just remember – you can make a difference. So make your pledge, and help me to save the polar bears."

Hey everybody... I want to introduce you to Emily!



Why Is This the Year of the Frog?



The importance of wetlands ecosystems worldwide is indisputable. Today, frogs and other amphibians are one of the **indicator species** that are revealing the problems taking place in those ecosystems. These species are disappearing worldwide and that disappearance has been attributed to a number of problems. The Association of Zoos and Aquariums has declared 2008 to be the Year of the Frog in hopes of

drawing people's attention to this growing problem. Unfortunately, many people try to point to a single cause to explain environmental problems. However, most situations such as the amphibian crisis are caused by more than one thing. Disease, pollution, loss of habitat, pesticides and ultraviolet radiation all play a role in amphibian loss. As individuals, we can try to address those things that are within our power to help fix. You can find a list of some

things **you** can do on page 16.

The Louisville Zoo exhibits a number of fascinating frog species and other amphibians. And as part of the Year of the Frog efforts we are participating in a conservation programs for the Northern leopard frog and the hellbender.

Panamanian Golden Frog



Smokey Jungle Frog



Cuban Tree Frog (bottom left)



Tomato Frogs (left)

Hellbender

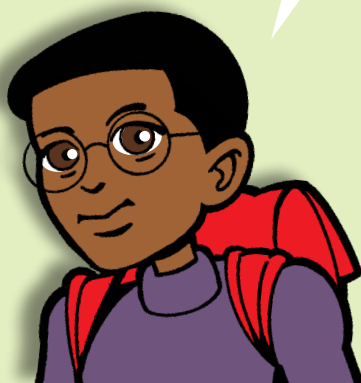
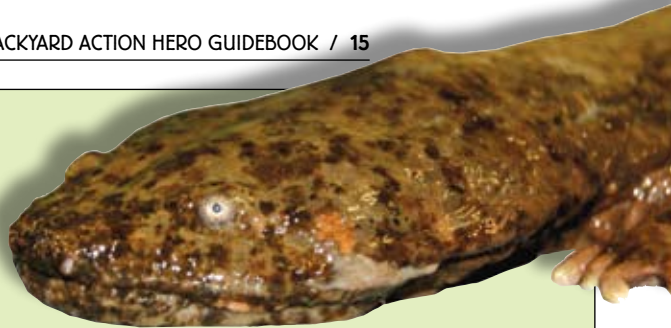
The Hellbender is one of the largest species of salamanders in the world. It is found in clear flowing mountain streams and bordering wetland areas in both the Appalachian and Ozark Mountains of the eastern and central United States. The presence of the Hellbender is actually an indicator of good water quality. These large salamanders, reaching up to 2 ½ ft. long, are covered by a wrinkly skin. While the Hellbender does have lungs,

most of its oxygen is taken in through the skin. The multiple wrinkles help increase surface area and thus more skin in which to absorb oxygen. Because their skin is so absorbent, any pollutants in the water are a problem, thus a Hellbender in the stream would signal that the stream or wetland must be fairly clean.

This highly endangered amphibian is in trouble

throughout its range. Water pollution and habitat destruction are some of the main reasons their numbers are declining.

Cool animal – strange name!
You can see a hellbender in the Zoo's HerpAquarium.



Northern Leopard Frog

The Northern leopard frog once ranged throughout the northeastern to north central United States and into southern Canada. This medium sized spotted frog can be found inhabiting a variety of settings from dirty cloudy marshlands, to damp meadows, weedy edges of streams and lakes to brackish water marshes.

Like many frogs they feed on insects, small invertebrates and on occasion may even eat small rodents. Basically if they can swallow it, they may eat it. Like many species of frogs they tend to be nocturnal, or active at night.

You may have noticed frog vocalizations in the early evening or after sunset in and around ponds and streams in your area. The Northern leopard frog has 3 distinct vocalizations, one known as an advertisement call to locate others of its kind, a warning call when alerted to danger, and a release call when in the act of mating.

The Northern leopard frog, like many amphibian species, appears to be in decline. Numerous reasons have been proposed for these losses, from overuse of pesticides, to pollution, habitat destruction, global warming and exposure to UV radiation due to ozone depletion. Chances are all have had some effect on the loss of amphibians all over the planet.



White's
Tree Frog



Northern
Leopard Frog



Here's how YOU can be a real
Backyard Action Hero!

As a Backyard Action Hero you can help in many ways to protect amphibians and the wetlands on which they depend.

- Limit pesticide use, especially in areas near wetlands.
- Create buffer zones of plants between those wetlands, streams and ponds and the areas being used by people.
- Don't litter or pollute our environment.
- Spread the word about the importance of wetlands and the role that amphibians play in their ecosystems.
- Read more about wetlands and the amphibian crisis on the Zoo's website at www.louisvillezoo.org.

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